

SILICON POWER TRANSISTOR 2SA1648, 2SA1648-Z

PNP SILICON EPITAXIAL TRANSISTOR FOR HIGH-SPEED SWITCHING

The 2SA1648 is a mold power transistor developed for highspeed switching and features a very low collector-to-emitter saturation voltage.

This transistor is ideal for use in switching regulators, DC/DC converters, motor drivers, solenoid drivers, and other low-voltage power supply devices, as well as for high-current switching.

FEATURES

- Available for high-current control in small dimension
- Z type is a lead processed product and is deal for mounting a hybrid IC.
- Mold package that does not require an insulating board or insulation bushing
- Low collector saturation voltage:
 VcE(sat) = -0.3 V MAX. (@Ic = -3 A)
- Fast switching speed:
 tf = 0.3 µs MAX. (@Ic = -3 A)
- · High DC current gain and excellent linearity

ABSOLUTE MAXIMUM RATINGS (Ta = 25 °C)

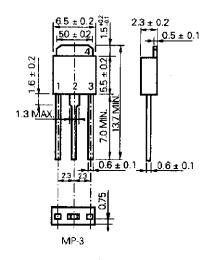
| Parameter | Symbol | Ratings | Unit |
|------------------------------|--------------------|---------------|------|
| Collector to base voltage | Vсво | -100 | ٧ |
| Collector to emitter voltage | VCEO | -60 | ٧ |
| Emitter to base voltage | VEBO | -7.0 | V |
| Collector current (DC) | Ic(DC) | -5.0 | Α |
| Collector current (pulse) | IC(pulse)* | -10 | Α |
| Base current (DC) | I _{B(DC)} | -2.5 | Α |
| Total power dissipation | Рт (Tc = 25 °C) | 18 | W |
| Total power dissipation | P⊤ (Ta = 25 °C) | 1.0**, 2.0*** | W |
| Junction temperature | Tj | 150 | °C |
| Storage temperature | T _{stg} | -55 to +150 | °C |

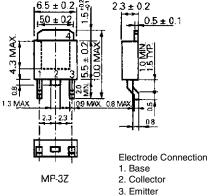
*: PW \leq 300 μ s, duty cycle \leq 10%

**: Printing board mounted

***: 7.5 mm² × 0.7 mm ceramic board mounted

PACKAGE DRAWING (UNIT: mm)





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ELECTRICAL CHARACTERISTICS (Ta = 25°C)

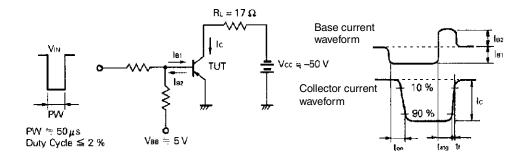
| Parameter | Symbol | Conditions | MIN. | TYP. | MAX. | Unit |
|------------------------------|-------------------------|---------------------------------------------------------------------------------------------------|------|------|------|------|
| Collector to emitter voltage | VCEO(SUS) | Ic = -3.0 A, Iв = -0.3 A, L = 1 mH | -60 | | | V |
| Collector to emitter voltage | VCEX(SUS) | Ic = -3.0 A, IB2 = $-I_{B1}$ = -0.3 A, VBE(OFF) = 1.5 V, L = $180~\mu$ H, clamped | -60 | | | V |
| Collector cutoff current | Ісво | Vce = -60 V, IE = 0 | | | -10 | μΑ |
| Collector cutoff current | ICER | Vce = -60 V, R _{BE} = 50 Ω , Ta = 125 °C | | | -1.0 | mA |
| Collector cutoff current | ICEX1 | Vce = -60 V, Vbe(OFF) = 1.5 V | | | -10 | μΑ |
| Collector cutoff current | ICEX2 | $V_{CE} = -60 \text{ V}, V_{BE(OFF)} = 1.5 \text{ V},$ $Ta = 125 \text{ °C}$ | | | -1.0 | mA |
| Emitter cutoff current | ІЕВО | V _{EB} = -5.0 V, I _C = 0 | | | -10 | μΑ |
| DC current gain | hFE1* | Vce = -2.0 V, Ic = -0.5 A | 100 | | | |
| DC current gain | hFE2* | Vce = -2.0 V, Ic = -1.0 A | 100 | 200 | 400 | |
| DC current gain | h _{FE3} * | $V_{CE} = -2.0 \text{ V, Ic} = -3.0 \text{ A}$ | 60 | | | |
| Collector saturation voltage | V _{CE(sat)1} * | Ic = -3.0 A, IB = -0.15 A | | | -0.3 | V |
| Collector saturation voltage | VCE(sat)2* | Ic = -4.0 A, I _B = -0.2 A | | | -0.5 | V |
| Base saturation voltage | V _{BE(sat)1} * | Ic = -3.0 A, IB = -0.15 A | | | -1.2 | V |
| Base saturation voltage | V _{BE(sat)2} * | Ic = -4.0 A, IB = -0.2 A | | | -1.5 | V |
| Collector capacitance | Cob | V _{CB} = -10 V, I _E = 0, f = 1.0 MHz | | 80 | | pF |
| Gain bandwidth product | f⊤ | Vce = -10 V, Ic = 0.5 A | | 90 | | MHz |
| Turn-on time | ton | $Ic = -3.0 \text{ A}, R_L = 17 \Omega,$ | | | 0.3 | μs |
| Storage time | tstg | $I_{B1} = -I_{B2} = -0.15 \text{ A}, \text{ Vcc } \cong -50 \text{ V}$ Refer to the test circuit. | | | 1.5 | μs |
| Fall time | tf | Trefer to the test circuit. | | | 0.3 | μs |

^{*} Pulse test PW \leq 350 μ s, duty cycle \leq 2%/Pulsed

hfe CLASSIFICATION

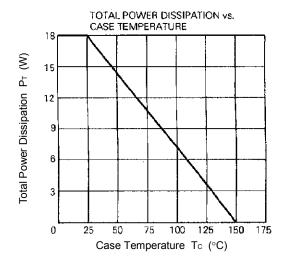
| Marking | М | L | K |
|------------------|------------|------------|------------|
| h _{FE2} | 100 to 200 | 150 to 300 | 200 to 400 |

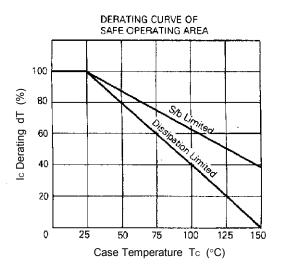
SWITCHING TIME TEST CIRCUIT

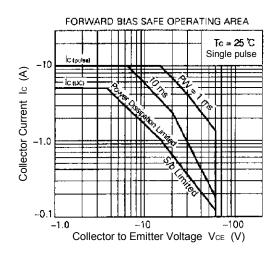


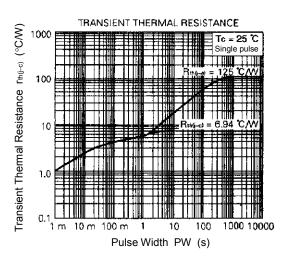


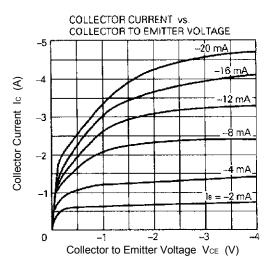
TYPICAL CHARACTERISTICS (Ta = 25°C)

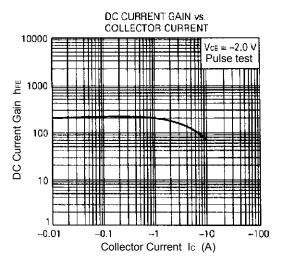


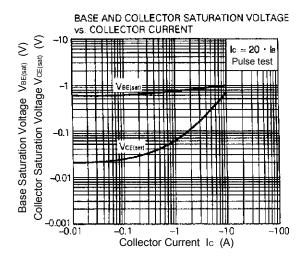


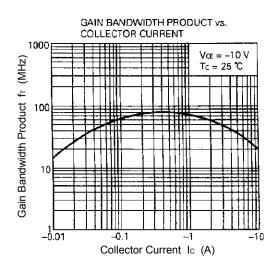


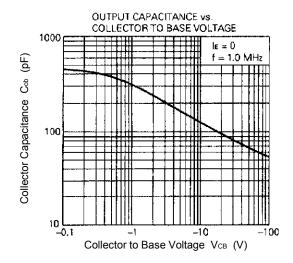


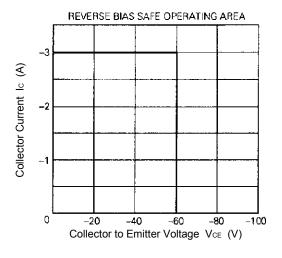


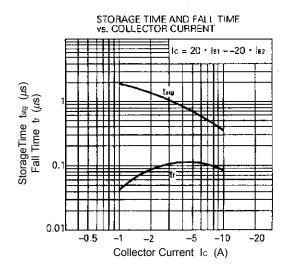














[MEMO]

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